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Via Electronic Filing

Jocelyn G. Boyd
Chief Clerk/Administrator
Public Service Commission of South Carolina
Post Office Drawer 11649
Columbia, SC 29211

**Re: Utility Integration Studies of Dominion Energy South Carolina, Incorporated
(Pursuant to Commission Directive Order No. 2020-583)
Docket No. 2020-219-A**

Dear Ms. Boyd:

I am writing on behalf of Dominion Energy South Carolina, Inc. ("DESC") in response to the Notice of Virtual Forum issued in this docket on September 14, 2020. Specifically, I am writing to notify the Public Service Commission of South Carolina (the "Commission") that DESC intends to participate in the virtual forum on October 6, 2020, and to provide DESC's written comments regarding the integration study initiated pursuant to S.C. Code Ann. § 58-37-60 (the "Integration Study").

Background

DESC is a regulated, vertically-integrated utility that provides wholesale and retail electric service to customers in South Carolina. DESC operates an integrated electric utility system that serves approximately 753,000 customers in 24 counties in central, southern, and southwestern South Carolina. DESC's service territory covers nearly 16,000 square miles in South Carolina, including the metropolitan areas of Charleston, Columbia, Beaufort, Aiken, and many other smaller cities, towns, and rural areas in South Carolina.

DESC's parent company, Dominion Energy, Inc., announced earlier this year that it intends to achieve net-zero emissions by 2050—one of the boldest commitments yet in the energy sector. Likewise, DESC has received numerous awards recognizing its specific commitment to renewable energy. Today, DESC has 973.1 MW of solar photovoltaic generation systems comprised of residential, commercial, utility scale and community solar. DESC has an additional 794 MW of highly-efficient and environmentally-friendly hydro-generating stations. Finally, the Dominion Energy Innovation Center houses the Duke Energy eGRID, an electrical grid simulator,

and the world's most-advanced wind-turbine drivetrain testing facility. The two labs allow for research on some of the challenges that result from the additional adoption of renewable resources.

DESC is actively planning for a more sustainable and environmentally-friendly future in which it will make substantial investments and work collaboratively to add not only renewable generation, but also establish emerging technologies—including battery storage (both as grid assets and generation assets), efficient gas turbines, charging stations for the promotion of electric vehicles, microgrids, smart grids and smart devices, distributed energy resources, and similar technology (collectively, "Emerging Technologies")—as part of a net-zero emissions future. However, DESC must achieve these goals while maintaining a safe and reliable electric system. These emission goals and DESC's commitment to renewable energy can only be fulfilled through thoughtfully-engineered system planning, a diverse resource mix on the DESC system, and the deployment of Emerging Technologies.

As a regulated utility, the Public Utility Regulatory Policy Act of 1978, 16 U.S.C. §§ 2601, et seq. ("PURPA") requires DESC to purchase power from renewable generators designated as Qualifying Facilities (each, a "QF") under PURPA. DESC is required to purchase such power without regard for need, location, or impact on reliability. DESC must also provide distribution and transmission service at no charge to the QF. Although PURPA applies to a range of renewable energy fuel sources, DESC has experienced high saturation levels of a single fuel source—QF solar. The amount of generation from variable, uncontrolled solar QFs on the DESC system has increased sharply in recent years and impacts DESC's system today and DESC's ability to meet its future carbon-emission goals.

For example, in the summer of 2019, the nameplate capacity of utility-scale solar generation on the DESC system was approximately 485 MW. For the summer of 2020, the nameplate capacity of utility-scale solar generation on the DESC system exceeded 849 MW—an approximately 75% increase year-over-year—with utility-scale solar generation capacity expected to exceed 1,000 MW in the near future. In total, there are over 4,016 MW of additional planned solar projects pending in DESC's state and federal queue. DESC's highest recorded daytime system load was 4,926 MW on August 10, 2007, while DESC's average daily peak load is less than 3,300 MW. Although DESC recognizes solar generation can be a critical resource in creating a net-zero emissions future and supports its deployment on the DESC system, it is not the only avenue to meeting its goals. Indeed, to meet its ambitious goals and to do so with customers' best interest in mind, DESC will have to deploy a range of Emerging Technologies.

Challenges Presented by Integrating Renewable QF Generation

The integration of such high levels of variable solar QF generation on the DESC system has system-wide consequences that become more significant and complex as penetration levels continue to increase. Perhaps the most significant operational concern presented by the amount of variable, must-take QF solar is DESC's ability to balance the DESC system—a system that must be carefully planned, built, and operated to ensure that DESC is able to continuously provide safe and reliable service to all of its customers. To date, DESC has been able to use existing generator capabilities, and has adjusted operations to counteract solar's variability, but DESC's ability to continue doing so is reduced each time a new solar generator is connected.

Stand-alone solar QFs typically can have frequent unplanned drops in generation, further exacerbated by the use of low-cost, low-quality inverters, resulting in a reactionary operating environment for DESC's operators. Unexpected storms, or even simple cloud cover, can abruptly

reduce the power production of these QFs. Unlike traditional generation with ramping capabilities, decreases in solar generation are nearly instantaneous. Moreover, these unplanned drops in generation are typically correlated across numerous solar QFs on the DESC system, which creates increased balancing and reliability concerns for DESC. Additionally, solar QFs—unlike solar that is planned and owned by a utility—are not planned and sited to serve current of forecasted load. Rather, solar QFs are typically sited in the cheapest possible locations rather than locations that are well-supported by the transmission system. This can create additional strain on the system to transport the energy to where load requirements are highest.

Although the North American Electric Reliability Corporation (“NERC”) and the Federal Energy Regulatory Commission (“FERC”) have implemented standards to account for the operation, performance, and corresponding effects of renewable generation, generating QFs located on the DESC system are exempt from FERC regulations and—almost without exception—have a power production capacity of less than 75 MW, which evades NERC regulation and South Carolina’s Utility Siting and Environmental Protection Act. This means that most of generating QFs on the DESC system are not subject to any NERC reliability standards, and do not have to comply with FERC requirements—such as those in FERC Order No. 827, which mandates nonsynchronous generators comply with certain power factors, reactive power limits, and real power output thresholds. These standards implemented by NERC and FERC aim to improve the reliability of the Bulk Power System, and currently, these standards apply to only one solar QF on the DESC system.

To ensure that DESC is able to maintain a safe and reliable system despite the uncertainty and reliability challenges presented by solar QFs, DESC must maintain additional operating reserves. These operating reserves guard against the inevitable unplanned drops in generation from those QFs to ensure the DESC system does not experience an unacceptable shortfall in generation. However, carrying these additional reserves as a direct result of solar QFs means that DESC incurs additional costs to maintain the DESC system. To prevent DESC’s customers from being responsible for costs properly attributable to QF solar, the Commission has ordered DESC to recoup them from the generators necessitating such costs via integration charges in DESC’s standard offer and form power purchase agreement (all such charges, “Integration Charges”).

Commission Approval of Integration Charges

The fact that DESC’s customers incur costs arising from these integration challenges is not in dispute in the instant proceeding. Rather, this docket seeks to comprehensively evaluate the effects of integrating renewable energy on the DESC system and the corresponding costs of such integration at various level of increasing penetration both for today and in the future. DESC has already proven before the Commission that its customers incur additional costs as a direct result of the variability of solar QFs. In Order No. 2019-847, the Commission held that the imposition of Integration Charges an interim amount of \$2.29/MWh was “just and reasonable to customers, consistent with PURPA and FERC regulations and orders, non-discriminatory to QFs, and serve[s] to reduce the risk placed on the using and consuming public.”¹ Although that interim amount was reduced to \$0.96/MWh, the Commission held that the imposition of Integration Charges at the initial value was “supported by the evidence of record.”²

¹ Order No. 2019-847 at 56, issued on December 9, 2019, in Docket No. 2019-184-E.

² Order No. 2020-244 at 4, issued on March 24, 2020, in Docket No. 2019-184-E.

In establishing the interim value for Integration Charges, the Commission held that a superseding value would be implemented once “the integration study process set out in Section 58-37-60 is completed.”³ S.C. Code Ann. § 58-37-60(A), as implemented by S.C. Act No. 62 of 2019 (“Act 62”) provides, in part:

The [C]ommission and the Office of Regulatory Staff are authorized to initiate an independent study to evaluate the integration of renewable energy and emerging energy technologies into the electric grid for the public interest. An integration study conducted pursuant to this section shall evaluate what is required for electrical utilities to integrate increased levels of renewable energy and emerging energy technologies while maintaining economic, reliable, and safe operation of the electricity grid in a manner consistent with the public interest. Studies shall be based on the balancing areas of each electrical utility.

Therefore, the Integration Study with respect to DESC will also evaluate the issues on the DESC system that DESC has laid before the Commission time and time again—the reliability challenges arising from the increasing levels of variable generation which are approaching high levels of saturation on the DESC system. Given DESC’s experience in dealing with these challenges while maintaining economic, safe, and reliable dispatch, DESC is uniquely positioned to provide the Commission insight regarding the metrics the Integration Study should evaluate to provide meaningful, accurate results from which the Commission can determine not only the impacts to the DESC system as a whole, but also calculate a value for the Integration Charges that reflects the practical realities of the DESC system.

DESC Comments Regarding the Integration Study

At a high-level, the goal of the Integration Study should be to comprehensively evaluate the wide array of challenges and costs (both direct and indirect)—including any impediments or potential barriers to entry—related to integrating additional renewable generation and Emerging Technologies “into the electric grid for the public interest,” as required by Act 62. DESC believes that the items that should be evaluated by the Integration Study primarily fall within five categories:

- A. Stakeholder Input and Data Collection;
- B. System Operation;
- C. Electric Reliability and Security;
- D. System Planning; and
- E. Saturation and Emerging Technologies.

DESC offers the following suggestions to promote the evaluation of integrating renewable energy and emerging energy technologies into the electric grid for the public interest.

A. Stakeholder Input and Data Collection

The challenges presented by variable, uncontrolled solar QFs on the DESC system are complex issues. The factors comprising those issues—as well as any possible solutions to those issues—are unique to each balancing area (“BA”). Because of this, Act 62 properly requires that the Integration Study be limited to only DESC’s BA. As such, it is critical that the Integration Study properly account for attributed unique to the DESC system. Therefore, DESC proposes to host a

³ *Id.* at 21.

series of stakeholder meetings to ensure the consultants chosen fully understand key aspects of the DESC system, including:

1. Existing and future generation and load profiles, including low and minimum load expectations;
2. Annual system peak and energy forecasts;
3. DESC generating unit operating parameters;
4. Physical location of generating QFs relative to generation resource needs;
5. Overview of the DESC transmission and distribution system and system planning criteria of the same;
6. Percentage of generation on the DESC system comprised of variable generating QFs;
7. Operational dispatch experience, including off-system power transactions, with variable solar and its impact on DESC's compliance with NERC standards; and
8. Studies, assessments, operating experience, lessons learned, and reports from other jurisdictions analyzing operational issues so that reliability on the DESC system is not compromised.

The stakeholder process would permit DESC to present detailed data to provide a comprehensive overview of the DESC system—which is different from the systems of neighboring utilities—and engage in an exchange of ideas related to best-practices from integration studies in other jurisdictions. DESC believes such a stakeholder process would be a fundamental and critical first step toward ensuring those conducting the Integration Study have the required information to accurately assess the reliability impact and associated costs of variable, uncontrolled QF generation on the DESC system.

B. System Operation

Act 62 requires these generators and Emerging Technologies to be implemented while also maintaining economic, safe, and reliable operation of the DESC system. In order to maintain the DESC system in such a way, DESC personnel must adapt and respond to conditions on the system in real-time. Although the vast majority of QFs on the DESC system are not subject to reliability standards, DESC must respond to these real-time fluctuations—which are exacerbated by these solar QFs—in accordance with certain NERC and FERC requirements. As such, the Integration Study must necessarily account for this dichotomy—generators unbound by reliability standards that put power to an accountable regulated utility—and should consider associated impacts, including:

1. Whether existing reserve levels adequately account for the variability arising from existing and future generators.
2. The costs of operating reserves DESC is required to carry as a direct result of renewable generation on its system in order to maintain compliance with mandatory reliability standards.

3. Variability of such resources during times of peak system load—when generating resources have the greatest impact on overall system reliability as measured by loss-of-load probability—including corresponding ramp and range requirements for units committed to serve such load.
4. Operational impacts and costs of seasonal variability of renewable resources and accompanying variations in reserve costs.
5. Forecasting's impact on day-ahead economic dispatch planning and real-time operation.
6. Accuracy of forecasts for such renewable generation and such forecasts' impact on DESC's real-time balancing obligations.
7. Whether more frequent or detailed forecasts would enhance integration and reduce related integration costs.
8. Best practices for generating QFs to self-supply at least a portion of reserves—whether through storage or otherwise.
9. Best practices for utility-owned and/or -dispatched Emerging Technologies.

C. Electric Reliability and Security

As discussed above, NERC and FERC have numerous requirements for jurisdictional generators to ensure the reliability and security of the Bulk Power System. However, those requirements are simply inapplicable to a vast majority of QFs on the DESC system. As part of the Integration Study, DESC recommends evaluating the following items to ensure the Integration Study accounts for the security and reliability concerns associated with these generators as well as comparing the costs of future generations of renewable generators that meet NERC guidance:

1. An assessment of integrating current QF generators against integrating those that meet NERC and FERC guidance, requirements, rules, and regulations, including those related to:
 - a. Power Factor Range;
 - b. Point of Measurement;
 - c. Dynamic Power Capacity;
 - d. Real Power Output Threshold;
 - e. Inertia Levels;
 - f. Frequency Response;
 - g. Reactive Capability, Voltage Support, and Producing Capability Curves to the TO;
 - h. Mandatory Fault Ride-Through Capability;
 - i. Utilization of Digital Fault Recorders;

- j. Protection Settings and Resource Tripping;
 - k. Power Quality Assessment/System Strength Evaluation (e.g., short-circuit ratio, voltage flicker, harmonics);
 - l. New Improvements in Inverter Capability and “No Trip Zones;”
 - m. Reliable Forecasting (hourly and accuracy tracking); and
 - n. System Restoration as Penetration Levels of Nonsynchronous Generation Rises.
2. Additional costs resulting from the high penetration of generators that do not meet these requirements.
 3. The impact of integrating advanced solar generators with the capability to meet such requirements, such as utility-owned generation.

D. System Planning

System planning is a fundamental component of DESC’s operation of the DESC system. Accurate forecasts ensure that DESC is able to allocate resources, as well as invest in its system. As such, the Integration Study must account for various planning horizons. For example, the Integration Study must not only evaluate the impact of day-ahead forecasts for generation, but also the impacts that such generators have on DESC’s system planning, which projects generation and load requirements years into the future. Relevant considerations include:

1. The forecasted penetration levels of renewable energy on the DESC system over the next 10 years—both in an aggregate number and as a percentage of the overall DESC system.
2. To what extent the lack of state siting authority for QFs below 75 MW affects DESC’s system planning.
3. Impacts of such generation on DESC’s IRP analysis and impact on future economic development.
4. Impacts of planning for and siting such generation based on reliability requirements and system needs.
5. The costs DESC incurs to build-out transmission assets to incorporate renewable generation in remote areas on the DESC system.

E. Saturation and Emerging Technologies

As discussed above, FERC and NERC have addressed the operation and performance of renewable energy generating facilities, and FERC even amended its pro forma Large Generator and Small Generator Interconnection Agreements to require that all newly interconnecting resources within its jurisdiction install, maintain, and operate a functioning governor or equivalent controls as a precondition of interconnection effective May 15, 2018. Although benefits of Emerging Technologies with regard to these generators is widely recognized, the impacts of the current high saturation of solar QFs that have not taken measures to reduce

variability could be a negative incentive for generators to invest in Emerging Technologies which promote DESC's goal of carbon reduction. DESC believes that appropriate implementation of Emerging Technologies will be critical in resolving current issues arising from solar QFs, as well as helping to meet its future goals. As such, DESC believes that the following items should be considered in the Integration Study:

1. Avenues by which Emerging Technologies—including advanced inverters, battery storage, and DESC-transmission and distribution system storage devices—can be utilized to improve reliability and associated impact to DESC ratepayers.
2. To what extent saturation of solar QFs on the DESC system provide barriers to entry for generators wishing to utilize Emerging Technologies and corresponding “opportunity costs”—which include environmental costs.
3. Quantifying the benefits of such Emerging Technologies to not only the DESC system, but also to DESC's customers.
4. Identify and quantify whether PURPA's must take obligation creates a negative incentive to deploy smarter generators with advanced devices such as next generation inverters and any associated environmental costs.

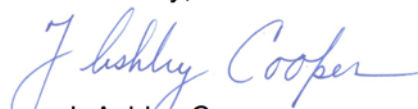
Proposed Next Steps

Although DESC believes the items included in these comments are critical to consider, DESC acknowledges that there are other items that will likely need to be considered as well, and does not intend for these comments to exclusively define the parameters of the Integration Study. Although the framework of the Integration Study is critical, so too is the consultant hired by the Commission to conduct the Integration Study under such framework. If the Commission does engage a consultant as permitted by Act 62, that consultant should have expertise and experience analyzing the factors described above, including NERC and FERC requirements, as well as the integration challenges posed by variable generation.

Finally, DESC believes that stakeholder engagement is important to ensure that the Integration Study considers the appropriate items and nuances of the DESC system, and DESC respectfully requests the Commission permit DESC to be involved with and lead a discussion with the selected consultant and any interested stakeholders. An appropriate framework for the Integration Study combined with an expert in these areas to conduct the same is the only way to ensure that the Integration Study provides a meaningful assessment of the items required by Act 62. DESC would welcome any opportunity to provide feedback to the Commission on appropriate qualifications for a consultant engaged under Act 62.

Thank you for your time and consideration of these matters.

Sincerely,



J. Ashley Cooper

JAC:hmp

cc: (Via Electronic Mail)
All parties of record in Docket No. 2020-219-A